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Investments in and returns on network embeddedness: An experiment with trust games

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ABSTRACT

Trust problems are ubiquitous in social and economic exchange. They are known to be mitigated if exchange partners are embedded in social structures that disseminate information on past behavior. If such "network embeddedness" makes exchanges possible that would not be possible otherwise, it is also expected that actors are willing to exert effort to establish embeddedness. Theory suggests that the degree to which network embeddedness facilitates trust depends on the size of the trust problem, and there are reasons to expect that embeddedness facilitates trust more strongly if it is established endogenously rather than imposed exogenously. We tested these predictions in a laboratory experiment in which 342 participants played repeated trust games with exogenous or endogenous embeddedness under varying sizes of the trust problem. The results confirm that embeddedness promotes trustfulness and trustworthiness. The results also show that endogenously chosen embeddedness promotes trustfulness more strongly than exogenously imposed embeddedness. However, we find no systematic variation in investments in embeddedness or effects of embeddedness in the size of the trust problem.

1. Introduction

Social and economic exchange often presupposes trust. It requires that one party, the trustor, acts in a way that leaves himself vulnerable to exploitation by the other party, the trustee (Hardin, 2002; Rousseau et al., 1998). Some people are inclined to trust others because they expect that most people are trustworthy most of the time (Reimann et al., 2017), or they are wiling to accept the vulnerability due to altruistic preferences (Ashraf et al., 2006). Some people are also indeed trustworthy in most situations, for example, because they would feel guilty if abusing trust or because they value their exchange partners' well-being (Attanasi et al., 2015). Still, even if some people are internally motivated to be trustful or trustworthy, many exchanges would not take place if there were no additional contextual factors that facilitate trustfulness and trustworthiness (Buskens et al., 2018; Riegelsberger et al., 2005; Simpson and Willer, 2015).

The "embeddedness" (Granovetter, 1985) of exchanges in word-of-mouth networks and other institutions for the sharing of reputation information constitutes a context that mitigates trust problems. Such embeddedness facilitates trustfulness because it enables trustors to learn about trustees from the experiences of other trustors. In addition, it gives trustees strong incentives to act honestly because developing a bad reputation could inhibit many future exchanges. These reputation mechanisms facilitate exchange in various situations (Buskens and Raub, 2013; Klein, 1997; Milinski, 2016). Good ratings of past buyers give us the trust necessary to buy goods or services online (Dellarocas, 2003; Przepiorka et al., 2017; Snijders and Weesie, 2009), bureaus that document credit histories facilitate credit lending (Brown and Zehnder, 2010; Djankov et al., 2007), and we do not hesitate to lend valuable personal belongings to friends, expecting that they will want to avoid that we have to tell common friends of their neglect.

While several empirical studies support the hypothesis that embeddedness promotes trustfulness and trustworthiness (Bohnet and Huck, 2004; Bohnet et al., 2005; Bolton et al., 2004; Buskens et al., 2010; DiMaggio and Louch, 1998; Frey and Van de Rijt, 2016; Gulati and Gargiulo, 1999; Huck et al., 2010; Robinson and Stuart, 2007), a few studies find no effects of embeddedness on trust or related cooperative behaviors (Corten et al., 2016; Grujić et al., 2010; Huck et al., 2012; Van Miltenburg et al., 2012). In this paper we discuss an experiment that seeks to replicate the finding that embeddedness facilitates trust but also adds to the literature on trust and embeddedness in two further respects. Before we continue, we want to mention that trust problems are also mitigated by the embeddedness of exchanges in long-term relationships between specific partners ("dyadic embeddedness").

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However, this paper focuses on "network embeddedness" (embeddedness in social structures for information sharing among trustors; see Buskens and Raub, 2002; Inaba and Takahashi, 2018, on the distinction). We will often refer to network embeddedness simply as embeddedness. We furthermore refer to placing trust also as *trustfulness* and to honoring trust as *trustworthiness*, with *trust* sometimes referring to both.

1.1. Investments in establishing embeddedness

In addition to studying *effects of* (network) embeddedness, we study *investments in* establishing embeddedness. It is generally expected that if certain institutions or networks have value for actors to achieve their goals, actors may purposively set up such institutions or networks (Flap, 2004; Lin, 2002, Chap. 8; Prendergast, 1999). Thus, if embeddedness makes exchanges possible that would not be possible without embeddedness, actors may actively establish embeddedness with an eye to the expected returns. That is, trust problems create incentives for online traders to pay for the services of external reputation platforms, for banks to invest in setting up information sharing systems (Brown and Zehnder, 2010; Guseva and Rona-Tas, 2001), and for ordinary people to introduce their friends to each other. Frey et al. (2015), Frey (2017), and Raub et al. (2013) develop game-theoretic models for the understanding of such investments in establishing network embeddedness as a means to facilitate trust. To our knowledge, the current paper provides the first explicit investigation of this idea in a controlled experiment.

This paper thus also studies consequences of trust problems for social structures, not only consequences of social structures for trust. Earlier research on the consequences of trust problems has shown that trust problems lead people to exchange with partners with whom they have pre-existing, non-commercial relationships (DellaPosta, 2017; DiMaggio and Louch, 1998; Simpson and McGrimmon, 2008). Trust problems also induce people to form dyadic, long-term exchange relations with partners with which they made good experiences (Brown et al., 2004; Cook et al., 2004; Kollock, 1994; Yamagishi et al., 1998) and in the framework of such repeat exchange, positive emotions thrive that reinforce the commitment (Kuwabara, 2011; Molm et al., 2000). Furthermore, trust problems can lead to a reputation-based process of preferential attachment (Duxbury and Haynie, 2018) and arbitrary inequality in exchange volumes between equally trustworthy trustees (Frey and Van de Rijt, 2016). In this paper we attempt to contribute to this literature and to show that trust problems also induce actors to invest in setting up networks or other institutions for the sharing of reputation information.

Recent research suggests that it is not at all obvious that actors anticipate the benefits of embeddedness and are willing to pledge a costly investment to establish embeddedness. Kamei (2017) finds in a laboratory experiment that a substantial fraction of trustees choose to make themselves immune to reputation effects by concealing their identities, if this is possible free of costs. Other studies—contextualized experiments on information sharing in labor markets (Gërxhani et al., 2013) and credit markets (Brown and Zehnder, 2010) as well as abstract experiments on trust situations (Abraham et al., 2016; Duffy et al., 2013) and related social dilemmas (Camera and Casari, 2018)—have investigated settings in which every act of information sharing is associated with a small cost. A key conclusion that can be drawn from these studies is that if information sharing is costly, information is shared considerably less often and levels of trustfulness and trustworthiness are lower than if information sharing is costless (but still higher than if there is no possibility for information sharing at all). In contrast to these papers, we investigate whether embeddedness is a viable solution to trust problems if it is costly to set up a network or institution for information sharing, and we abstract from incentive problems in the actual transmission of information once such a network or institution is in place.

1.2. Moderators of the effects of embeddedness

This paper furthermore investigates under what conditions embeddedness facilitates exchange more or less strongly. As Mizruchi et al. (2006, p. 310) note, studies on embeddedness "have gone far in demonstrating that networks matter, but they have contained the seeds of something more: that the extent to which networks matter varies across actors and situations." We study two potential moderators of the effects of embeddedness.

First, we test the hypothesis that there is an inverted U-shape relation between the "size" of the trust problem and the degree to which embeddedness facilitates trust (see Frey et al., 2015; Frey, 2017; Raub et al., 2013 for game-theoretic models). This hypothesis suggests that embeddedness matters most in trust problems of intermediate size. In very small trust problems—e.g., if you are convinced of the conscientiousness of your friend—there will be a lot of trust also without embeddedness and, hence, the embeddedness effects are small. If the trust problem is very large—e.g., if someone asks for a loan to do business in an industry that is known for unreliable entrepreneurs—there will be hardly any trust even with embeddedness and, hence, the embeddedness effects are likewise small. If there is such an inverted U-shape in the *effects of* embeddedness, one would expect that also *investments in* embeddedness are most likely in trust problems of intermediate size (Frey et al., 2015; Frey, 2017; Raub et al., 2013). We test both these hypotheses.

Empirical evidence for an inverted U-shape in the effects of embeddedness could help explain the finding that low-trustors tend to be more sensitive to embeddedness than high-trustors (Simpson and McGrimmon, 2008), and it would imply that findings of null effects of embeddedness should be interpreted with caution (see e.g., Corten et al., 2016; Huck et al., 2012; Van Miltenburg et al., 2012). Furthermore, it would suggest that ingroup favoritism may be strongest in trust problems of intermediate size, as it has been hypothesized that ingroup favoritism in trust situations reflects that networks that make reputational concerns relevant are present within groups but absent between groups (Yamagishi and Mifune, 2008). In this sense, evidence for an inverted U-shape in the effects of network embeddedness could also help explain why the evidence for intergroup discrimination in trust situations is mixed (Balliet et al., 2014; Robbins, 2017; Romano et al., 2017).

Second, we investigate whether it matters if embeddedness is established endogenously or imposed exogenously. Studies indicate that certain institutions mitigate social dilemmas especially strongly if they were chosen endogenously (e.g., Gürerk et al., 2014; Sutter et al., 2010). Schneider and Weber (2013), for example, show that a longer interaction duration (dyadic embeddedness) promotes cooperation more if it is chosen endogenously by the actors rather than imposed exogenously. We hypothesize that this is also the case for network embeddedness, due to self-selection and costly signaling. For example, trustors who are particularly sensitive to third-party information are probably also particularly inclined to establish embeddedness, and we would then expect that embeddedness established by trustors has stronger effects on trustfulness than exogenous embeddedness. A trustee's investment in establishing embeddedness could furthermore facilitate trust particularly strongly because it could serve as a costly signal of trustworthiness (Frey, 2017).

We do not investigate these mechanisms directly but test whether embeddedness facilitates trust more if it is established by the actors themselves rather than imposed exogenously. If this is the case, people could benefit especially much from embeddedness in interactions outside of their close circles. Moreover, networks that make reputational concerns salient could not only lead to ingroup favoritism, as it has been argued, but they could also put outgroup members at an advantage: An outgroup member that exerted effort to become part of the networks of the ingroup could be perceived as especially trustworthy by ingroup members, more trustworthy even than someone who was born into these networks.

2. The experiment

We describe the design of our experiment before we develop the theoretical arguments and state the hypotheses. This allows making clear what we theorize about and avoiding redundancy.

2.1. The Repeated Triad Trust Game (RTTG) and the experimental conditions

The Repeated Triad Trust Game (RTTG) that we designed to study effects of and investments in embeddedness is played in groups of three participants: Two trustors and one trustee. The trustors and the trustee interact in repeated trust games with incomplete information (Camerer and Weigelt, 1988; Dasgupta, 1988; Johnson and Mislin, 2011). Before the interactions in Trust Games (TGs), there may be the opportunity to establish network embeddedness—information sharing between the trustors about the behavior of the trustee.

We first explain the TG. In each TG, the trustor who is at play first decides whether to place trust. If the trustor does not place trust, the TG ends and trustor and trustee both earn $P = 30$ "points". If the trustor places trust, the trustee can honor or abuse trust. If the trustee honors trust, trustor and trustee both receive $R = 50$ points. If the trustee abuses trust, the trustor receives $S = 0$ points. We assume that the trustee is of either of two "types", and how many points the trustee earns when abusing trust depends on his type. Abusing trust earns the trustee $T = 100$ points if he is of the *opportunistic type* and $T^* = 0$ points if he is of the *friendly type*. The trustee knows his type but the trustors are only informed about the probability with which the trustee is of either of the two types. The assumption of types of trustees who differ in their incentives to abuse trust is a standard assumption in the theoretical literature on reputation and has been implemented in similar ways by Camerer and Weigelt (1988) and in subsequent experiments.

In the RTTG, the TG is part of a larger game that starts with the determination of the trustee's type. Then, there may be the opportunity for the trustors or the trustee to invest in establishing embeddedness, and then each trustor plays three TGs with the trustee (see Fig. 1). We now explain the RTTG in detail and at the same time introduce the experimental conditions.

At the beginning of the RTTG, the trustee's type is determined and announced to the trustee. With probability π the trustee is of the friendly type and with probability $1 - \pi$ the trustee is of the opportunistic type. Everyone knows the probability π and knows that everyone knows π (π is common knowledge). However, only the trustee knows his actual type.

We had three conditions with respect to the size of π, namely, $\pi = 0.05$, 0.2, and 0.4. These conditions represent different sizes of the trust problem and we refer to them with the labels $\pi.05$, $\pi.2$, and $\pi.4$. The trust problem is largest in the condition $\pi.05$ and smallest in $\pi.4$, as we will explain in Section 3. Substantively, the different π conditions could reflect contexts that differ in the chance of a trustee having non-standard preferences that offset material incentives for trust abuse. For example, it could be more likely in face-to-face interactions than in computer-mediated interactions that a trustee feels so guilty when abusing trust that he is better off if he honors trust. Because non-monetary motives are difficult to manipulate experimentally, we varied the size of the trust problem by giving some trustees no monetary incentive to abuse trust and by varying the probability π of such a "friendly" trustee.

The RTTG was played in four conditions with respect to embeddedness. In the condition with exogenously given embeddedness (EXO_EMB) as well as the condition in which there is no embeddedness and no possibility to establish it (EXO_NoEMB), the game proceeds directly from the determination of the trustee's type to the play of the TGs (see Fig. 1). We will use the label EXO to refer to these conditions jointly. In the other two conditions, embeddedness can be established by the trustoRs (condition ENDO_R) or the trusteE (condition ENDO_E) before the TGs. In ENDO_R, the trustors both choose independently whether to propose to invest. If both propose to invest, embeddedness is established and each trustor incurs a cost of 20 points. If only one trustor proposes to invest, embeddedness is not established and neither trustor incurs any cost. In ENDO_E, the trustee simply decides whether to pay 40 points for establishing embeddedness. All three actors are

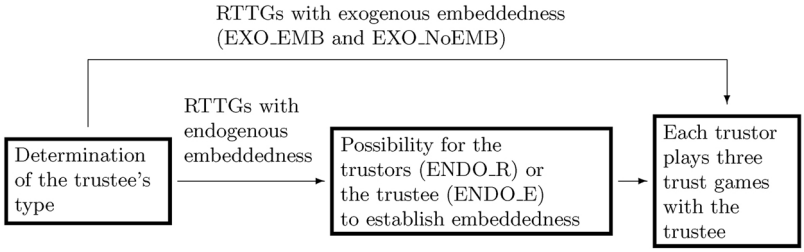
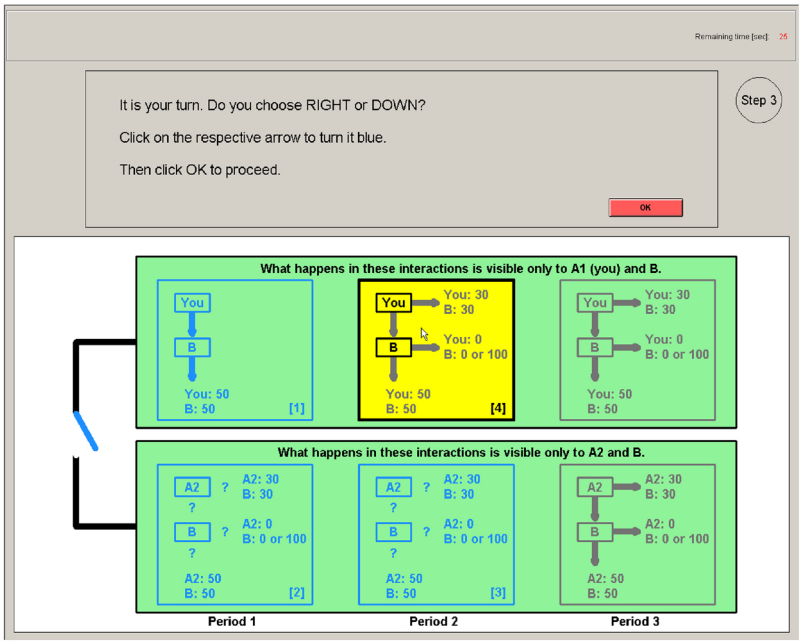
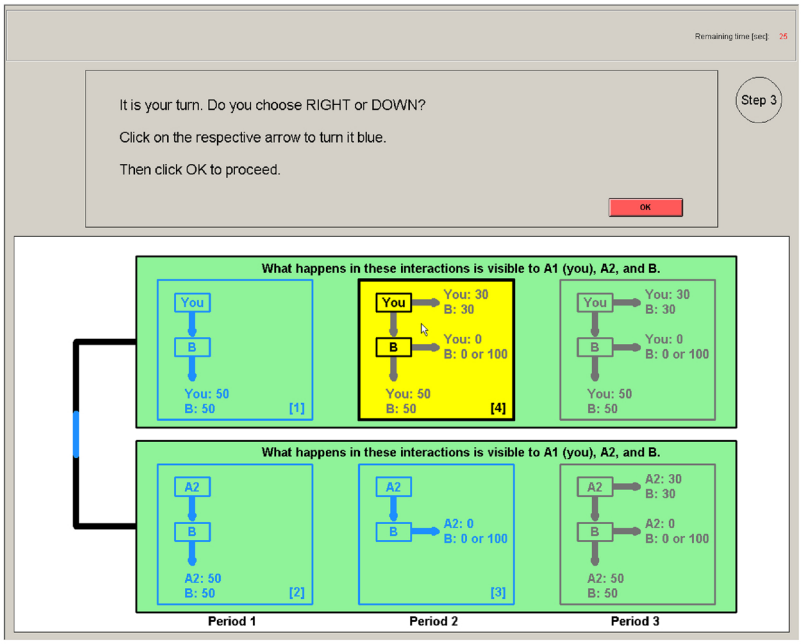


Fig. 1. Timeline of the Repeated Triad Trust Game (RTTG).



(a) Without network embeddedness.



(b) With network embeddedness.

Fig. 2. Example screens from the experiment illustrating the play of the trust games and the availability of information on past choices to a trustor 1 ("You").

informed about whether embeddedness is established before the game proceeds and they know that the others are informed, too.[1]

Then, each trustor plays three TGs with the trustee. We say that the TGs are played over periods 1 to 3, with each trustor playing one TG every period. Which trustor plays first in some period is determined randomly every period. If embeddedness has been established or is exogenously given, both trustors receive information about the choices that were made after every TG. If there is no embeddedness, each trustor receives information only on his own TGs.

The earnings of a participant in an RTTG are the sum of points the participant earned in the TGs, potentially minus the cost of an investment in establishing embeddedness.

2.2. The computer interface

To strengthen the understanding of the RTTG, we discuss briefly how it was implemented in the computer interface. Fig. 1 Fig. 2 shows two

[1] The actors are informed about whether embeddedness is established, but in ENDO_R they are not informed about the trustors' individual investment decisions.

Table 1
Number of sessions by the probability π of a friendly trustee and the embeddedness conditions used first and second. Participants per session in parentheses.

	Probability of a friendly trustee		
	π.05	π.2	π.4
EXO_EMB, EXO_NoEMB	1 (21)	1 (18)	1 (15)
EXO_NoEMB, EXO_EMB	1 (21)	1 (18)	1 (21)
ENDO_R, ENDO_E	2 (18, 18)	2 (24, 18)	2 (18, 15)
ENDO_E, ENDO_R	2 (18, 21)	2 (21, 15)	2 (21, 21)

EXO_NoEMB: No network embeddedness, exogenously imposed.
EXO_EMB: Network embeddedness, exogenously imposed.
ENDO_R: Trustors can establish network embeddedness.
ENDO_E: Trustee can establish network embeddedness.

screens a trustor 1 could see while playing his second TG. Trustor 1 is asked to choose "RIGHT" (no trust) or "DOWN" (trust). We used neutral labels in order to avoid inducing normative associations. A1, A2, and B represented trustor 1, trustor 2, and the trustee. The ongoing TG is displayed on a yellow (bright) background, past TGs are shown in blue (light gray), and numbers in square brackets inform about the order in which the past TGs were played. If embeddedness has been established endogenously or is given exogenously, trustor 1 ("You") sees what happened in all past TGs (Fig. 2b). If there is no embeddedness, the trustor sees only question marks in the other trustor's past TGs (Fig. 2a). The trustee was always shown all past choices in the TGs.

To avoid any confusion about the availability of information on behavior in the TGs it was written above the three TGs of each trustor who receives information about the choices in these TGs, and the "switch" in the line that connects the boxes of the TGs of trustor 1 and trustor 2 also indicated whether there is embeddedness. Note furthermore that it says in Fig. 2 "B: 0 or 100" next to the arrows that represent trust abuse. This reflects that a trustor is uncertain about the trustee's type. On the screen of an opportunistic trustee it would say "You: 100" in each TG and on the screen of a friendly trustee it would say "You: 0" in each TG.

2.3. Organization and design

The experiment was held at the ELSE laboratory at Utrecht University using z-Tree (Fischbacher, 2007). The 342 participants (average age = 23, 55% females, mostly undergraduate students) were recruited from the laboratory's online subject pool using ORSEE (Greiner, 2015). The participants read printed instructions (see Appendix B), took a quiz to check their understanding, and then interacted in RTTGs. They sat at isolated computers and the interactions were anonymous. The sessions lasted between one hour and twenty minutes and one hour and fifty minutes and ended with the participants privately receiving cash for the points they earned in the RTTGs (16.9 Euro on average, 1 Euro for every 150 points). The sessions were not unusually long for this type of experiment (e.g., Camerer and Weigelt, 1988) and the payment is standard in the Netherlands for this amount of effort.

We held 18 experimental sessions. A typical session had 21 participants (min = 15, max = 24) divided into 7 triads. In a session, the participants played twelve RTTGs and they were assigned to new roles and triads between each of these twelve RTTGs. The roles were rotated such that a participant who was a trustor 1 in the first RTTG became trustor 2 in the next RTTG, then trustee and then again trustor 1…. After the roles were assigned, the triads were formed randomly. It was unavoidable that some participants played in more than one RTTG together. The participants were informed about this but the instructions also stressed that if it occurs, they will not be able to recognize it.

The π conditions were varied between sessions and the embeddedness conditions between as well as within sessions. In every session, participants played six RTTGs in one embeddedness condition and then six RTTGs in a different embeddedness condition. For each π condition we held one session with EXO_EMB in the first six RTTGs and EXO_NoEMB in the second six RTTGs, and one session with the reversed order. For the conditions ENDO_R and ENDO_E we held two sessions per π condition and order (see Table 1). With this design we collected data on 223 and 228 RTTGs played in the conditions EXO_NoEMB and EXO_EMB, respectively, and on 456 RTTGs played in each of the conditions ENDO_R and ENDO_E.[2]

3. Theory and hypotheses

We will theorize about investments in and effects of embeddedness in an informal manner and refer the reader to other papers for game-theoretic details. Yet, we start with a somewhat technical exposition of how the size of the trust problem depends on the probability of the trustee being of either of the two types that we assumed. The TG that participants played in our experiment represents a social dilemma: Game-theoretic rationality implies that the trustor would not place trust if the trustor and trustee interacted only once in a TG, while both actors would be better off if trust was placed and honored. An opportunistic trustee would in a game-theoretic equilibrium of a one-shot TG abuse trust whereas a friendly trustee would honor trust. In equilibrium, the trustor would then place trust only if the trustor's expected payoff from placing trust, $\pi R + (1 - \pi)S$, is larger than the payoff from no trust, P. That is, the trustor places trust only if $\pi > (P - S)/(R - S)$. This condition for trustfulness in a one-shot TG becomes less restrictive if the probability π that the trustee is of the friendly type is larger, and in this sense the trust problem is largest in the condition π.05 and smallest in the condition π.4. However, this condition for trustfulness does not even hold in the condition π.4.

In the RTTG trust can nevertheless be possible because a focal TG is embedded in a dyadic relationship: Trustor and trustee interact repeatedly, namely, three times. Theoretical analyses show that such dyadic embeddedness can make trust possible when trust would not be attainable if the trustor and trustee interacted only once (Bower et al., 1997; Camerer and Weigelt, 1988; Buskens et al., 2018; Kreps and Wilson, 1982). In a repeated TG, the trustor can reward trustworthiness by placing trust again and punish trust abuse by withholding trust. Such conditional behavior provides incentives for trustworthiness. In addition, experience from previous TGs enables the trustor to learn about unobservable characteristics of the trustee, such as the trustee's type. The sequential equilibrium captures these mechanisms game-theoretically (Camerer and Weigelt, 1988). In this equilibrium, trust is placed and honored in early TGs under a broad range of parameters. Also a trustee of the opportunistic type honors trust in early TGs, balancing the short-term benefits and long-term costs of trust abuse. However, toward the end the "shadow of the future" (Axelrod, 1984) decreases and trust may break down.

Network embeddedness can further facilitate trust, as theoretical studies show (e.g., Buskens, 2003; Buskens and Weesie, 2000; Kreps, 1990). In the RTTG, network embeddedness enables the trustors to learn about the trustee from each other's experiences, and so the trustee has to take into account that his choice in *one* TG will affect the future choices of *both* trustors. Buskens (2003) analyzes effects of network embeddedness in a scenario in which two trustors interact with one trustee, just as in the RTTG. The analysis shows that if the trustors exchange information on the trustee with sufficiently high probability, trustfulness and trustworthiness typically start to decline later in the sequential equilibrium. We thus expect that trust will be placed and honored more often in RTTGs with network embeddedness than in RTTGs without network embeddedness.

[2] We have data on 223 rather than 228 RTTGs played in EXO_NoEMB due to a technical problem in one session.

Table 2
Decisions of trustors and trustees to (propose to) invest in establishing embeddedness, overall and by π condition. Proportions in parentheses.

	All	π.05	π.2	π.4
Trustors	0.49 (446/912)	0.46 (137/300)	0.50 (156/312)	0.51 (153/300)
Trustees (all)	0.26 (119/456)	0.31 (46/150)	0.20 (31/156)	0.28 (42/150)
Friendly	0.29 (30/103)	0.17 (1/6)	0.17 (5/30)	0.36 (24/67)
Opportunistic	0.25 (89/353)	0.31 (45/144)	0.21 (26/126)	0.22 (18/83)

If network embeddedness facilitates trust, actors may be willing to pledge a costly investment to establish it. Frey et al. (2015) and Frey (2017) theoretically study such endogenous investments in embeddedness, building on the model by Buskens (2003) (see Raub et al., 2013, for an alternative model). They show that rational trustors (Frey et al., 2015) and trustees (Frey, 2017) will be willing to pledge a costly investment to establish network embeddedness before interacting in TGs, anticipating that embeddedness makes exchanges possible that would not be possible without embeddedness.

The game-theoretic analyses by Frey et al. (2015), Frey (2017), and Raub et al. (2013) furthermore suggest that there is an inverse U-shape relation between the size of the trust problem and the degree to which network embeddedness facilitates exchange and, consequently, how much actors are willing to pay for establishing network embeddedness. Trust is hardly attainable if the trust problem is very large. For instance, if there is only a tiny chance that the trustee is of the type who cannot benefit from abusing trust, it is very likely that the trustee will try to abuse trust toward the end and therefore trustfulness and trustworthiness are uncertain already in early TGs. There will then be only little honored trust even with network embeddedness and the effect of network embeddedness is thus small. Embeddedness should also have rather little impact in small trust problems. In small trust problems, the level of honored trust will be high already with dyadic embeddedness alone and network embeddedness leads only to marginally more honored trust.

Our values of the probability π that the trustee is of the friendly type are chosen such that the experiment allows testing this inverted U-shape prediction. An equilibrium analysis implies larger effects of embeddedness on trustfulness and trustworthiness in π.2 than in π.05 and π.4. Accordingly, for ENDO_R and ENDO_E we also expect that participants are more inclined to invest in establishing embeddedness in π.2 than in π.05 and π.4. A trustor can recuperate the investment of 20 points if embeddedness leads to honored trust instead of no trust in one more TG. The equilibrium analysis suggests that this is the case in π.2 but not in π.05 and π.4. For a trustee to recuperate the investment, trust should be placed and honored in about two more TGs. Friendly as well as opportunistic trustees can expect to benefit from an investment in π.2 and to a lesser extent also in π.05.

Summarizing, this sketch of the equilibrium analysis of our experimental games implies the following hypotheses:

- (*a*) Trustors and (*b*) trustees are more likely to (propose to) invest in establishing embeddedness in the condition π.2 than in the conditions π.05 and π.4.
- (*a*) Trustors are more inclined to place trust and (*b*) opportunistic trustees are more inclined to honor trust if there is embeddedness than if there is no embeddedness.
- The effect of embeddedness on (*a*) placing trust and (*b*) honoring trust is larger in π.2 than in π.05 and π.4.

Theoretical arguments and empirical findings furthermore suggest that network embeddedness affects behavior more strongly if it is chosen endogenously rather than imposed exogenously. Several experiments show that certain institutions facilitate cooperative behaviors particularly strongly if they were chosen endogenously (e.g., Gürerk et al., 2014; Schneider and Weber, 2013; Sutter et al., 2010). We expect that this is also the case with (network) embeddedness. Embeddedness established by the trustors could promote trustfulness particularly strongly due to self-selection: Trustors who anticipate that embeddedness could discipline the trustee should be especially inclined to establish embeddedness and they will also be especially trustful if there is embeddedness. Similarly, trustees who realize how valuable a good reputation can be should be especially likely to invest in embeddedness and also be particularly trustworthy if there is embeddedness. That is, due to self-selection we expect particularly strong effects of embeddedness on trustfulness in ENDO_R and on trustworthiness in ENDO_E. It is furthermore conceivable that trustors who observe that the trustee establishes embeddedness realize that this trustee is probably aware of the value of a good reputation and will behave in a trustworthy manner in order to establish and maintain such a reputation. Therefore, embeddedness established by the trustee could promote also trustfulness more strongly than exogenous embeddedness. That a trustee is more sensitive to embeddedness in ENDO_R than EXO seems less plausible, because even a trustor who fails to anticipate the effects of embeddedness will probably stop placing trust *after* observing that the trustee abused the other trustor's trust. So we do not predict that trustworthiness is affected differently by embeddedness in ENDO_R and EXO.

A trustee's investment in embeddedness could also serve as a costly signal of trustworthiness (see Frey, 2017, for a game-theoretic analysis). Trustees who attribute particularly high value to trust being placed and honored could be especially willing to bear the cost of establishing embeddedness if this investment induces the trustors to be more trustful, because such trustees benefit especially much from the increase in trustfulness that the investment brings about. The trustors could then correctly interpret the trustee's investment as a signal that they are probably dealing with a trustworthy trustee and, hence, be particularly trustful. Such signaling could lead to stronger effects of embeddedness on trustfulness as well as trustworthiness in ENDO_E compared to EXO. In sum, the following hypotheses follow from these arguments.

- Embeddedness promotes trustfulness more strongly if the trustors can establish embeddedness than if embeddedness is exogenous.
- Embeddedness promotes (*a*) trustfulness and (*b*) trustworthiness more strongly if the trustee can establish embeddedness than if embeddedness is exogenous.

Table 3
Multi-level logistic regressions of the decisions to (propose to) invest in establishing embeddedness. Random intercept at the participant level.

	Investment proposals by trustors		Investments by friendly trustees		Investments by opportunistic trustees	
π.05	−0.33	(0.44)	−0.07	(1.69)	0.68	(0.40)
π.4	0.03	(0.44)	1.55	(1.06)	0.05	(0.46)
Constant	0.03	(0.31)	−2.34*	(1.18)	−1.74***	(0.35)
Variance particip. level	5.23***	(1.05)	3.18	(5.02)	1.67*	(0.99)
N decisions	912		103		353	
N participants	228		86		211	

Standard errors in parentheses.
*$p < 0.05$, ***$p < 0.001$.

4. Results

We first discuss investments in embeddedness (Section 4.1) and then how embeddedness affected trustfulness and trustworthiness (Section 4.2). Finally, we look at investments in embeddedness in light of the observed monetary returns on embeddedness (Section 4.3).

4.1. Investments in establishing embeddedness

Table 2 summarizes the participants' investment decisions. In ENDO_R, trustors took 912 decisions whether to propose to invest in establishing embeddedness, and they proposed to invest in 49% (446) of these decisions.[3] In ENDO_E, the trustee established embeddedness in 26% of the RTTGs.

Investments in embeddedness were not more frequent in the condition π.2 than in the conditions π.05 and π.4, contrary to the inverted U-shape hypotheses *H1a* and *H1b*. Trustors proposed to invest in about half of the instances in all π conditions. Friendly trustees established embeddedness most frequently in π.4 (36%) and opportunistic trustees in π.05 (31%). We tested hypotheses *H1a* and *H1b* statistically using multi-level logistic regressions of the investment decisions on dummies for the conditions π.05 and π.4, with π.2 as the reference category. The regressions are reported in Table 3 and include a random intercept at the level of individual participants to account for the repeated investment decisions by individual participants. The results do not support hypotheses *H1a* and *H1b*. Neither trustors, friendly trustees, or opportunistic trustees had a significantly lower tendency to (propose to) invest in establishing embeddedness in π.05 or π.4 than in π.2.[4]

4.2. Effects of embeddedness

How did embeddedness affect behavior in the trust games? We address this question only for trustors and opportunistic trustees. Friendly trustees did as expected almost always honor trust (in 99.2% of the instances), showing that the manipulation of trustee types was successful. We restrict the focus furthermore to TGs in which the trustor at play has not yet observed an abuse of trust in the focal RTTG (83% of all TGs). This allows analyzing embeddedness effects on trustfulness keeping trustee behavior in the preceding TGs of the focal RTTG constant, without using many variables to control for the history of play.[5]

In the remaining sample average "*trustfulness*" (0, 1) is 0.65 and average "*trustworthiness*" (0, 1; defined only if trust was placed) is 0.67.

Fig. 3 gives a descriptive overview of the effects of embeddedness. Fig. 3 shows how average trustfulness (panel (a)) and trustworthiness (panel (b)) developed over the six TGs of an RTTG in the different conditions with embeddedness and without embeddedness. The numbers in the lower left corner of each cell provide the averages over the six TGs. Fig. 3 provides ample evidence for the role of network embeddedness in the production of trust. In line with *H2a* and *H2b*, trustfulness and trustworthiness were consistently higher if there was embeddedness than if there was no embeddedness. This pattern replicates earlier findings (e.g., Bolton et al., 2004; Buskens et al., 2010; Huck et al., 2010) and also shows that participants understood the game well. Over the six TGs, trustfulness was up to 29%-points higher and trustworthiness was up to 34%-points higher. There is only one exception: In π.4, trustors were about as trustful in EXO_NoEMB as in EXO_EMB.

Fig. 3 offers little indication for an inverted U-shape in the effect of embeddedness (*H3a* and *H3b*). Averaged over the six TGs, embeddedness promoted trustworthiness indeed more in π.2 than in π.05 and π.4 if embeddedness was exogenous or could be established by the trustors. However, the effect on trustor behavior was in no scenario stronger in π.2 than in π.05 and π.4, and in ENDO_E embeddedness even promoted trustfulness as well as trustworthiness the least in π.2.

Finally, Fig. 3 suggests that embeddedness may mitigate trust problems more if it was established endogenously rather than imposed exogenously. Averaged over the six TGs, trustfulness tended to be more strongly affected by embeddedness in ENDO_R and ENDO_E than in EXO, quite consistently across the π conditions. This is in line with hypotheses *H4* and *H5a*. The picture is more ambiguous for trustee behavior. We predicted that embeddedness would promote trustworthiness more in ENDO_E than in EXO (hypothesis *H5b*). This is indeed observed in π.05 and π.4 whereas in π.2 embeddedness promoted trustworthiness more in EXO than in ENDO_E. To shed more light on the effects that Fig. 3 illustrates we now turn to the statistical analysis of the data.

We used multi-level logistic regressions to test our hypotheses. The full regression results are reported in Table A.1 in Appendix A and we will here discuss the Average Marginal Effects (e.g., Long, 1997, Chap. 3) of embeddedness on trustfulness and trustworthiness. We modeled the propensity of trustor *i* to place trust in TG *j* of RTTG *k* as a function of the experimental condition and the position of TG *j* in RTTG *k* as follows:

[3] Embeddedness was established, i.e., both trustors proposed to invest, in 24% of the RTTGs.

[4] Additional regressions show that neither trustors, friendly trustees, or opportunistic trustees were in one π condition significantly more or less inclined to (propose to) invest than in the other two π conditions together ($p > 0.05$). Furthermore, we find that in the condition π.4, friendly trustees had significantly higher odds to invest than opportunistic trustees (odds ratio = 1.32, $p = 0.03$; result obtained from regressing the trustees' investment choices on a dummy for the trustee's type, separately for each π condition).

[5] For the analysis of trustworthiness, it is conceivable to include the choices

(*footnote continued*)
that trustees made when trusted by a trustor who already observed an abuse of trust. However, these are only 107 choices (because after observing an abuse of trust, trustors placed trust in only 8.4% of the TGs) and including these choices does not affect the results qualitatively.

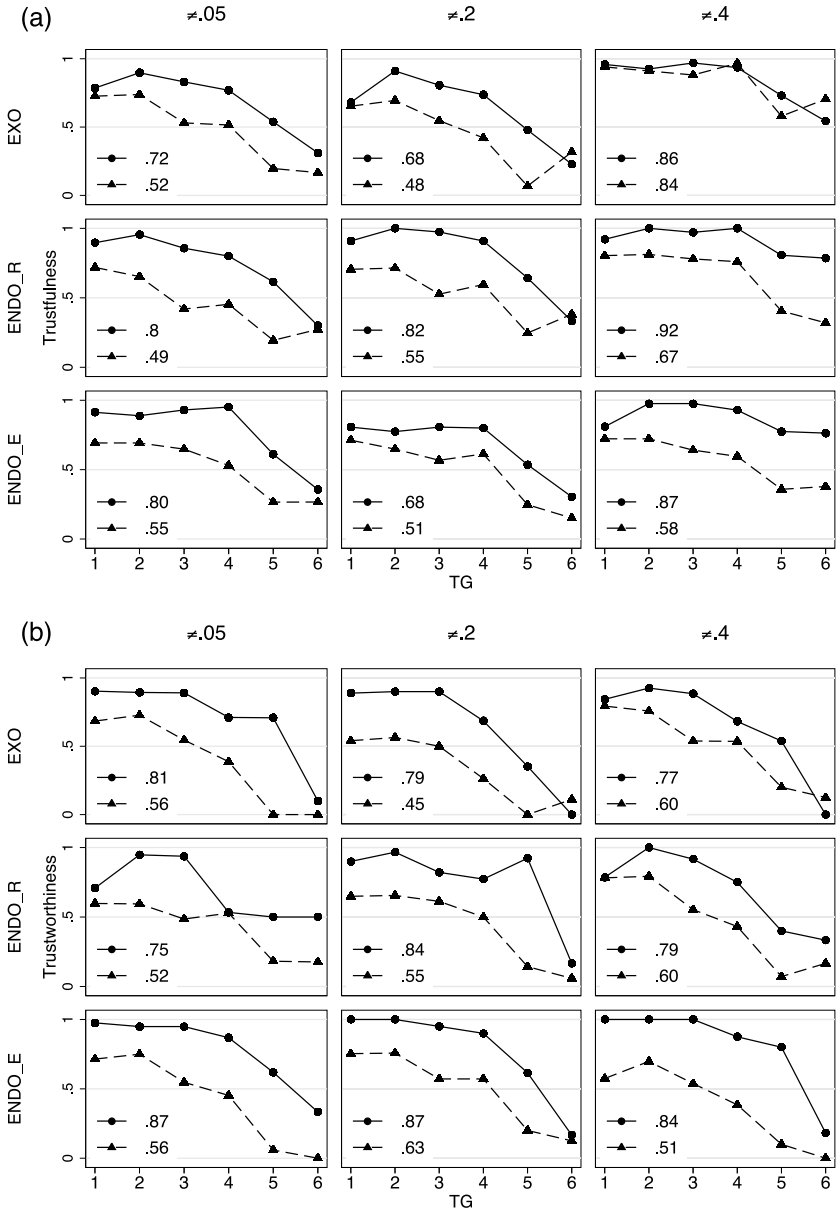


Fig. 3. Development of trustfulness and trustworthiness over the six TGs of an RTTG, with embeddedness and without embeddedness in the different conditions. Averages over the six TGs in the lower left corners.

$$\begin{aligned}\text{logit}(\text{trustfulness}_{ijk}) &= \beta_0 + \beta_1\text{ENDO\_R} + \beta_2\text{ENDO\_E} + \beta_3\text{COND} \\ &\quad \beta_0 + \beta_1\text{ENDO\_R} + \beta_2\text{ENDO\_E} + \beta_3\text{COND} \\ &\quad + \beta_6\text{POS} + u_i + \varepsilon_{ijk},\end{aligned}$$

β_3 indicates the vector of coefficients for the CONDition dummies EMB ("1" if there is embeddedness), π.05, and π.4 and the interactions EMB X π.05 and EMB X π.4. β_4 and β_5 are the coefficient vectors for these CONDition variables interacted with the dummies ENDO_R and ENDO_E, respectively. β_6 indicates the coefficient vector for the variables that control for the POSition in which TG j was played in RTTG k, namely, PERIOD ("1, 2, 3"), TG2InPeriod ("1" for the second TG in a period, "0" for the first TG in a period), and the interactions of these two variables with EMB. Finally, u_i is a random intercept for trustor i and ε_{ijk} is a stochastic error for the specific decision of trustor i in TG j of RTTG k. The same model was estimated for trustworthiness.

Panel (A) of Table 4 reports the Average Marginal Effects (AMEs) of embeddedness on trustfulness and trustworthiness. The AMEs inform how many %-points the probability of trustfulness or trustworthiness is higher in a TG with embeddedness than without embeddedness, averaged over the six TGs of an RTTG.[6] The large and highly significant AMEs of embeddedness in panel (A) support the hypotheses that embeddedness fosters trustfulness and trustworthiness (*H2a* and *H2b*). The only exception is that in π.4 there was no significant effect of exogenous embeddedness on trustfulness. In the same condition, trustees are predicted to be 19%-points more likely to honor trust if there is embeddedness than if there is no embeddedness.

Panel (B) reports the difference in the AMEs of embeddedness between the condition π.2 and the conditions π.05 and π.4. According to

[6] Differences between the AMEs in Table 4 and the numbers in Fig. 3 result from controlling for the position of a TG in an RTTG and accounting for the repeated decisions of individual participants.

Table 4
Average Marginal Effects (AMEs) of embeddedness on trustfulness and trustworthiness in the different experimental conditions (A), differences in the AMEs of embeddedness between π conditions (B), and differences in the AMEs of endogenous and exogenous embeddedness (C).

(A)	π.05		π.2		π.4	
Trustfulness						
Overall	.26***	(.02)	.22***	(.02)	.17***	(.02)
EXO	.22***	(.03)	.22***	(.04)	.02	(.02)
ENDO_R	.30***	(.04)	.26***	(.04)	.20***	(.03)
ENDO_E	.28***	(.04)	.20***	(.04)	.28***	(.03)
Trustworthiness						
Overall	.30***	(.03)	.32***	(.03)	.26***	(.03)
EXO	.30***	(.04)	.40***	(.05)	.19**	(.06)
ENDO_R	.22***	(.06)	.29***	(.05)	.21***	(.06)
ENDO_E	.35***	(.04)	.28***	(.05)	.38***	(.06)

(B)	Difference π.2 – π.05		Difference π.2 – π.4	
Trustfulness				
Overall	−.04	(.03)	.05	(.03)
EXO	.00	(.05)	.20***	(.04)
ENDO_R	−.05	(.06)	.05	(.05)
ENDO_E	−.07	(.05)	−.07	(.05)
Trustworthiness				
Overall	.02	(.04)	.07	(.05)
EXO	.10	(.07)	.21**	(.08)
ENDO_R	.07	(.08)	.08	(.08)
ENDO_E	−.07	(.06)	−.10	(.07)

(C)	Difference ENDO_R – EXO		Difference ENDO_E – EXO	
Trustfulness				
Overall	.10***	(.03)	.10***	(.03)
π.05	.08	(.06)	.06	(.05)
π.2	.04	(.05)	.01	(.05)
π.4	.19***	(.04)	.26***	(.04)
Trustworthiness				
Overall	−.06	(.04)	.03	(.04)
π.05	−.08	(.07)	.04	(.06)
π.2	−.11	(.07)	−.12	(.07)
π.4	.03	(.08)	.20*	(.08)

Based on the regressions in Appendix A, Table A.1.
Standard errors in parentheses.
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

the inverted U-shape hypotheses *H3a* and *H3b*, the AMEs of embeddedness should be larger in π.2 than in π.05 and π.4. However, these hypotheses are not supported. The AMEs of embeddedness on trustfulness and trustworthiness were not significantly larger in π.2 than in π.05 in any of the conditions EXO, ENDO_R and ENDO_E. The AMEs of embeddedness on trustfulness as well as trustworthiness were indeed significantly larger in π.2 than in π.4 in the case of exogenous embeddedness but not in ENDO_R and ENDO_E. Furthermore, while there are only two significant differences in the expected direction, the majority of the non-significant differences point in the opposite direction.

Finally, panel (C) concerns differences in the AMEs of endogenous and exogenous embeddedness. In line with hypotheses *H4* and *H5a*, embeddedness promoted trustfulness significantly more in ENDO_R and ENDO_E than in EXO. These differences are significant overall π conditions together as well as in π.4 separately. They are not significant in π.05 and π.2 separately, but they point in the expected direction. We interpret this pattern as indicative evidence for the hypotheses that embeddedness promotes trustfulness more strongly if it was established by the trustors or the trustee rather than given exogenously.

Table 5
Returns on embeddedness for the different actors: Difference in the average sum of earnings in the TGs in RTTGs with embeddedness compared to RTTGs without embeddedness. Potential costs of establishing embeddedness are *not* subtracted. Sample: all TGs.

	π.05	π.2	π.4
Trustor i			
EXO	19.7	18.7	10.5
ENDO_R	14.3	21.2	26.2
ENDO_E	31.0	20.0	31.5
Friendly trustee			
EXO	72.2	18.2	−7.7
ENDO_R	23.3	0.1	35.0
ENDO_E	68.0	18.4	31.1
Opportunistic trustee			
EXO	−2.3	−5.2	−20.4
ENDO_R	11.3	7.9	−17.4
ENDO_E	−7.2	5.7	20.9

For the behavior of trustees we did not predict that it would make a difference whether embeddedness could be established by the trustors or is exogenous. And indeed, embeddedness did not affect trustworthiness significantly more or less strongly in ENDO_R than in EXO. We did predict that trustworthiness would be more strongly associated with embeddedness if the trustee can establish embeddedness than if embeddedness is exogenous (*H5b*). However, this was not the case over all π conditions together. The AMEs of embeddedness on trustworthiness were indeed significantly larger in ENDO_E than in EXO in π.4 but in π.05 the difference is not significant and in π.2 there is even a difference in the opposite direction that falls not that much short of statistical significance ($p = 0.08$). This pattern does not support hypothesis *H5b*.

4.3. Linking investments in and returns on embeddedness

There was no inverted U-shape in the effects of endogenous embeddedness over the π conditions (Section 4.2). It is, therefore, not surprising that there was no inverted U-shape in investments in embeddedness neither (Section 4.1). It could still be the case that participants were most inclined to invest in embeddedness in the conditions in which the returns on embeddedness were largest. We conclude this section by briefly discussing the observed returns on embeddedness and the relation between observed investments and returns.

Table 5 reports the observed returns on embeddedness, namely, how many more points participants earned on average in total in the TGs of an RTTG if there was embeddedness than if there was no embeddedness. Trustors and friendly trustees had positive returns on embeddedness in almost all conditions.[7] Opportunistic trustees often benefited little or even suffered from embeddedness. Table 5, furthermore, implies that embeddedness increased the sum of the three actors' earnings in the TGs in all conditions. However, establishing embeddedness did rarely pay off for the investing actors. In ENDO_R, trustors could on average recuperate an investment of 20 points in the conditions π.2 and π.4. In ENDO_E, friendly trustees had a net benefit from establishing embeddedness only in π.05, and for opportunistic trustees the investment of 40 points did not pay off in any of the π conditions.

The comparison of observed investments in embeddedness (Table 2) with observed returns (Table 5) offers little indication that participants were more inclined to invest in embeddedness in the conditions in which the returns were larger. Regressing the investment choices on the returns

[7] Some cells in Table 5 pertaining to friendly trustees have few observations, especially for the condition π.05. In ENDO_E, π.05 only one friendly trustee was observed in the condition with embeddedness; compare Table 2.

reported in Table 5 does not reveal a significant effect of a 1-point increase in the returns on embeddedness on the odds of an investment in embeddedness (odds ratio = 1.002, $p = 0.825$; multi-level regression including also a dummy for whether a participant played as a trustor or trustee and a random intercept at the level of individual participants). Thus, we do not find that participants were more inclined to establish embeddedness in the conditions in which the returns were larger.

5. Discussion and conclusion

The results of our experiment clearly replicate the finding of earlier experiments that (network) embeddedness promotes trustfulness and trustworthiness (Bohnet and Huck, 2004; Bolton et al., 2004; Buskens et al., 2010; Huck et al., 2010). In addition, our study provides three novel findings that we will discuss in this section. First, the results show that trustors and trustees may invest in establishing embeddedness at a cost to themselves. Second, the results indicate that the effect of embeddedness on trustfulness and trustworthiness is robust to the size of the trust problem. Third, we found that embeddedness tends to promote trustfulness more strongly if embeddedness is chosen endogenously rather than imposed exogenously.

We assumed that actors anticipate that embeddedness mitigates trust problems and hypothesized that they will therefore be willing to pledge a costly investment to establish embeddedness (see Frey et al., 2015; Frey, 2017; Raub et al., 2013, for theoretical models). A substantial portion of trustors and trustees did indeed pledge a costly investment to establish embeddedness, confirming this expectation. However, these investments should be interpreted with some caution. It is not entirely clear whether the observed investments were pledged *because* embeddedness mitigates trust problems. Investments in embeddedness were not more likely in the conditions in which the observed returns were higher. Hence, it cannot be ruled out fully that participants established embeddedness, for example, merely out of curiosity or to reduce boredom and to experience what the effect might be. Yet, embeddedness promoted trustfulness and trustworthiness highly consistently in our experiment and it is therefore quite plausible that participants indeed anticipated the effects of embeddedness and that this anticipation motivated them to establish embeddedness. Future studies could shed more light on this issue by experimentally contrasting a situation that features a trust problem to a situation that does not feature a trust problem and in which embeddedness has no returns. The experiment of Frey and Van de Rijt (2016) includes such a comparison and indicates that trustors use third-party information only if there is a trust problem. This suggests that actors are probably indeed only willing to exert effort to establish embeddedness if there is a trust problem. If they do this by forming network links for information sharing between trustors who interact with the same trustees, trust problems will lead to network closure and homophily, to dense information networks within groups but not between groups.

Our results do not suggest that the effect of embeddedness would be diminished if the trust problem is "objectively" very small or very large. This robustness of the embeddedness effect stands at odds with the hypothesis that the effect follows an inverted U-shape in the size of the trust problem. The inverted U-shape prediction derived by Frey et al. (2015) and Frey (2017) hinges on how changes in the likelihood of a friendly trustee affect behavior in the sequential equilibrium. While changes in the probability of a friendly trustee had little impact on the behavior of trustors and opportunistic trustees in our experiment, Brandts and Figueras (2003) found the expected effects of changes in this probability. This discrepancy could reflect that participants played many more repeated games in the experiment of Brandts and Figueras (2003), as behavior tends to approach the sequential equilibrium with experience (Camerer and Weigelt, 1988; Neral and Ochs, 1992; Van Miltenburg et al., 2012). However, additional analyses of our data do also not reveal an inverted U-shape in the effect of embeddedness in games played toward the end of the sessions. Nevertheless, we believe that it is too early to dismiss the inverted U-shape hypothesis. Given that results are generally rather mixed regarding comparative-statics predictions of the sequential equilibrium (see Anderhub et al., 2002, and the references therein), it bears mentioning that the inverted U-shape hypothesis follows also from an alternative game-theoretic model (Raub et al., 2013). More importantly, the failure to observe the expected inverted U-shape could reflect limitations of our experimental design. Our experimental setting may have imposed a rather high cognitive demand on participants. In this complex, artificial lab situation some participants may simply not have paid much attention to the probability of a friendly trustee (which was varied between participants). Heterogeneity in social preferences could have further diminished the effectiveness of the manipulation of this probability as a manipulation of the size of the trust problem. A way to mitigate these problems in future experiments could be to measure participants' social preferences and propensities for trustfulness and trustworthiness at the beginning of the sessions and then group them such that one expects that trust is hardly possible in some groups but easily attained in other groups.

Finally, the presented results show that embeddedness tends to promote trustfulness more if it is chosen endogenously rather than imposed exogenously. If the trustors could establish embeddedness, it promoted trustfulness more strongly than exogenously imposed embeddedness. We predicted such an effect because trustors who are especially sensitive to embeddedness are probably also especially likely to invest in embeddedness.[8] An alternative explanation is that participants reflected more on the consequences of embeddedness merely because there was this investment option and because of the additional instructions describing it. However, this latter explanation is less plausible because we should then also have observed stronger effects on trustworthiness (trustees read the same instructions, they were informed that the trustors are "now" taking the investment decision, and they may earlier have been in the role of a trustor). Embeddedness established by the trustee also promoted trustfulness particularly strongly, but this effect was significant only in the condition with a small trust problem (π.4). The theoretic results on investments in embeddedness as signals of trustworthiness by Frey (2017) offer indications for why the stronger effects may have obtained only in that condition. Frey (2017) also offers indication for why signaling might not have lead to a stronger association between investments in embeddedness by trustees and their trustworthiness. The finding of stronger effects of endogenously established embeddedness on trustfulness needs replication and the underlying mechanisms need further investigation. Still, this finding does indicate that laboratory experiments with exogenous embeddedness (Bohnet and Huck, 2004; Bolton et al., 2004; Buskens et al., 2010; Huck et al., 2010, 2012; Van Miltenburg et al., 2012) might underrepresent the total degree to which embeddedness can mitigate trust problems. It also indicates that people could benefit from embeddedness particularly much if they move out of their closest social surroundings and invest in new networks to facilitate trust. In this sense, an outgroup member that actively sought to become part of the networks of the ingroup could appear as especially trustworthy to ingroup members, more trustworthy than it appeared before to the members of its own group.

[8] Our data are not suited for a thorough investigation of this conjecture on the underlying mechanism because trustors who did consistently not propose to invest were never observed in the condition with embeddedness. A design in which the same participants who play in ENDO_R also play in EXO_EMB and EXO_NoEMB would allow assessing this mechanism.

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Appendix A. Additional information on analyses and results

Table A.1
Multi-level logistic regression of trustfulness and trustworthiness. Random intercept at the subject level.

	Trustfulness		Trustworthiness	
EXO_NoEMB, π.2 (Reference cat.)				
EMB	1.48***	(0.28)	2.95***	(0.45)
π.05	0.27	(0.36)	0.71	(0.39)
π.4	2.49***	(0.39)	1.19**	(0.42)
ENDO_R	0.47	(0.32)	0.74*	(0.37)
ENDO_E	0.23	(0.32)	1.22***	(0.36)
EMB × π.05	0.10	(0.27)	−0.38	(0.41)
EMB × π.4	−0.87**	(0.31)	−1.13*	(0.48)
EMB × ENDO_R	0.48	(0.32)	−0.37	(0.48)
π.05 × ENDO_R	−0.64	(0.44)	−1.04*	(0.49)
π.4 × ENDO_R	−1.69***	(0.47)	−0.90	(0.52)
EMB × π.05 × ENDO_R	0.09	(0.49)	−0.30	(0.67)
EMB × π.4 × ENDO_R	1.16*	(0.51)	0.49	(0.76)
EMB × ENDO_E	−0.02	(0.30)	−0.22	(0.53)
π.05 × ENDO_E	−0.09	(0.44)	−1.04*	(0.49)
π.4 × ENDO_E	−1.97***	(0.47)	−1.76***	(0.53)
EMB × π.05 × ENDO_E	0.55	(0.43)	0.77	(0.68)
EMB × π.4 × ENDO_E	1.79***	(0.47)	1.73*	(0.81)
PERIOD	−1.18***	(0.05)	−1.75***	(0.11)
EMB × PERIOD	−1.29***	(0.08)	−1.83***	(0.14)
TG2InPeriod	0.00	(0.08)	−0.12	(0.11)
EMB × TG2InPeriod	−0.24	(0.13)	−1.04***	(0.18)
Intercept	2.13***	(0.28)	2.20***	(0.33)
Variance participant level	1.79***	(0.19)	1.31***	(0.23)
N decisions	6769		3046	
N subjects	342		335	

Standard errors in parentheses.
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

Appendix B. Supplementary data

Supplementary data associated with this article (Appendix B) can be found, in the online version, at https://doi.org/10.1016/j.socnet.2018.07.006. The data from the experiment and the Stata analysis file can be found at doi: 10.17605/OSF.IO/Y9MQP.

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